

VIII. *On Some Teratological Specimens.* By T. A. CHAPMAN, M.D., F.Z.S.

[Read March 6th, 1907.]

PLATE XII.

MR. KENNETH J. MORTON recently sent me a specimen of *Cynthia atra* with a three-fold tarsus on one hind-leg, and Mr. A. Bacot placed in my hands a specimen of *Catocala nupta* with a duplicate tarsus on the fore-leg. It so happens that a more unusual aberration of structure has occurred in a specimen of *Hastula hyerana* amongst those I have recently been rearing. Though the latter has probably nothing in common with the other two, still as all are aberrations of structure they may be noted together. I have illustrated them all in Plate XII; though somewhat diagrammatic, the outlines are fairly accurate in all important points, being from camera sketches.

The specimen of *Hastula hyerana* is a pupa that possesses jaws of the larval pattern. I have never before met with such a specimen, nor read of such an one, but this is possibly due to my defective literary explorations.

It is perhaps necessary to make it clear that these mandibles are pupal structures. We see, and more often hear of, pupæ, and even imagines with larval heads. Of these this description is accurate, the head is a larval head, *i. e.* the head of the larva, not cast at the moult but remaining *in situ* and having within it the pupal and imaginal heads proper.

These mandibles are not a persistence of larval mandibles, but the pupal mandibles, failing to recede to the simple pupal form, but taking on one almost identical with that characteristic of the larva.

On the plate Fig. 1 represents the head parts from the front of a normal pupa. The maxillæ and labial palpi below, the labrum with two hairs basally and the small triangular mandibles (in this and many other species, quadrangular, the apex being truncate), in the angle between the labrum above and the maxillæ below, the apex just touching the labium. Figs. 2 and 3 represent the specimen we are considering. Fig. 2 nearly in profile,

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Fig. 3 nearly front view. The mandibles do not lie flat as in Fig. 1, but project nearly at right angles to the surface. Whatever other causes there may be for this position, one is imperative, they are too large in every dimension to occupy the space provided for the normal pupal jaws.

It is the empty pupa case we are examining, so that the hiatus in Fig. 3 between the face and the maxilla is possibly due to opening on dehiscence, but even so, it was rendered easy by the size of the mandible preventing correct apposition. The space seen between this mandible and the labium is however a hollow, into which the mandible ought to have folded down. This hollow existed before dehiscence.

The jaws are conspicuous not only by their projection but also by possessing the black colour, quite dense along the margin, so common in larval jaws. It is indeed more intense than in the larva of *H. hyerana*, in which the darkness is only intense along the teeth and is there only deep brown. They appear to possess precisely the same teeth as those of the larva, viz. five, of which the lower is broad and flat. I say appear, because though the teeth are evident enough, they are somewhat less crisp and sharp than in the larva, and one might count them perhaps as four or six. This is due to the circumstance, that the mandibles are not smooth and polished like those of the larva, but have a finely wrinkled and sculptured surface, similar to the pupal surface generally. They are in no way articulated, but are continuous with the rest of the pupal surface, though they are in a sense well marked off from it. But on closer scrutiny, a definite suture line as in the normal pupa is not easily determined, for example in the figure 2, the near mandible shows a quasi-suture at the base of the blackest piece, this however is followed by a wrinkled base, marked off by a slighter possibly sutural line so that one cannot say certainly which is the one that divides jaw from face.

I awaited the emergence of the moth from this pupa with some interest. It had some difficulty in emerging, it left a portion of one antennæ in the pupa case, and more or less damaged all its wings, I imagine, in struggles to free itself. It succeeded, however, and expanded its wings. These difficulties had no immediate relation to the abnormal pupal jaws, but probably resulted from some

defect arising from the same causes, whatever they were, that led to the mandibular aberration. The mouth parts of the imago presented no trace of difference from the ordinary typical specimen.

I have given in Figs. 4 and 5 outlines of the larval jaws, Fig. 4 of the full-grown feeding larva, and Fig. 5 of the aestivating larva, jaws that it uses for no other purpose than to eat the cast skin. The differences between the two jaws of each pair are not altogether due to bad drawing, and not of course to any differences between the jaws of either side, but simply to a difference of angle of the specimens under the camera. It will be noticed that the aestivating jaws are smaller than the feeding ones, and the pupal ones smaller still (all are to same scale, a magnification of 22 diameters).

In the Ent. Mo. Mag., 1896, pp. 54-80, I related some cases of larvæ of *Agrotis comes* that became larvæ with some pupal characters on taking the moult that would normally have been that to pupa. The present is the only case of a similar sort I have since met with. In that case the active cause was some delay of development owing to irregular starvation. In this one I do not know the larval history, but the specimen was the very last to pupate out of some 430 examples. So that, if not starvation, some causes delaying the progress of development must have been active, but produced no visible effects except that on the mandibles and the difficulty of emergence from the pupa, whatever that may have been.

The specimen of *Catocala nupta* was exhibited at the Entomological Society on December 5th by Mr. Bacot. The left fore-leg has a widened and thickened tibia, with one tarsus almost normal and a second of smaller size beside it. When it came into my possession, the supernumerary tarsus had lost the last two joints by some accident, the third joint showing plainly that they had existed and were not absent congenitally. I have restored them conjecturally on the plate. The supernumerary tarsus is more slender than the normal one and of about two-thirds its length.

The specimen of *Capnia atra* is somewhat similar. In this case the tarsus affected is of the posterior leg. The tibia is normal or nearly so, but the first tarsal joint is much widened and carries at its broad extremity three second tarsal joints, each with normal third joints, claws

and appendages. I have here placed a normal limb, as with the *C. nupta*, for comparison. The affected joints are apparently fractionally shorter than normal, but perhaps a little wider than the healthy one. The basal joint of course is much broader, and may be regarded as three joints fused side by side.

My experiments in regenerations of limbs, of which I have not yet published a large number, performed some years ago, lead me to believe that these supernumerary limbs are all instances of regeneration, or if not all, at least a large proportion of them ; just as lizards occasionally regenerate two or even three tails.

I picture the group of embryonic cells, which form the regenerative centre, broken up, by the injury by which the limb is lost, into two or more portions ; and each of these portions performs its functions of developing into a new limb without reference to the others. This result, is sufficiently rare to make it probable that injury rarely divides up this no doubt very minute portion of tissue, and that when it does, the divided portions succeed in most cases in reuniting, or all but one of the separated portions are mortally injured.

All three specimens have been placed in the Natural History Museum, South Kensington.

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#### EXPLANATION OF PLATE XII.

[See *Explanation facing the PLATE.*]